

## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

- 1 | 1. (Currently amended) A computer program product~~method~~ for  
2 | computing interval parameter bounds from fallible measurements, comprising:  
3 | receiving a set of measurements  $z_1, \dots, z_n$ , wherein an observation model  
4 | describes each  $z_i$  as a function of a  $p$ -element vector parameter  $\mathbf{x} = (x_1, \dots, x_p)$ ,  
5 | wherein receiving the set of measurements involves  
6 | receiving values for a set of conditions  $c_1, \dots, c_n$  under which the  
7 | corresponding observations  $z_i$  were made,  
8 | wherein equations in the system of nonlinear equations  
9 | account for the conditions  $c_i$  and are of the form  $z_i - h(\mathbf{x} | c_i) = 0$   
10 | ( $i=1, \dots, n$ ), and  
11 | wherein each condition  $c_i$  is not known precisely but is  
12 | contained within an interval  $c_i^l$ ;  
13 | storing the set of measurements  $z_1, \dots, z_n$  in a memory in a computer  
14 | system;  
15 | forming a system of nonlinear equations  $z_i - h(\mathbf{x}) = 0$  ( $i=1, \dots, n$ ) based on  
16 | the observation model; and  
17 | solving the system of nonlinear equations to determine interval parameter  
18 | bounds on  $\mathbf{x}$ .

1 | 2. (Currently amended) The computer program product-method of claim 1,  
2 | wherein the system of nonlinear equations is an “overdetermined system” in  
3 | which there are more equations than unknowns.

1 | 3. (Currently amended) The computer program product-method of claim 1,  
2 | wherein each measurement  $z_i$  is actually a  $q$ -element vector of measurements  $\mathbf{z}_i =$   
3 |  $(z_{i1}, \dots, z_{iq})^T$ , and  $h$  is actually a  $q$ -element vector of functions  $\mathbf{h} = (h_1, \dots, h_q)^T$ .

1 | 4 (Canceled).

1 | 5. (Currently amended) The computer program product-method of claim 1  
2 | claim 4, wherein each condition  $c_i$  is actually an  $r$ -element vector of conditions  $\mathbf{c}_i$   
3 |  $= (c_{i1}, \dots, c_{ir})^T$ .

1 | 6 (Canceled).

1 | 7. (Currently amended) The computer program product-method of claim 1  
2 | claim 4, wherein equations in the system of nonlinear equations are of the form  $z_i$   
3 |  $- h(\mathbf{x} | c_i) + \varepsilon^1(\mathbf{x}, c_i) = 0$  ( $i=1, \dots, n$ ), which includes an error model  $\varepsilon^1(\mathbf{x}, c_i)$  that  
4 | provides interval bounds on measurement errors for  $z_i$ .

1 | 8. (Currently amended) The computer program product-method of claim 7,  
2 | wherein if  $z_i$  is actually a  $q$ -element vector of measurements  $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$ , then  
3 |  $\varepsilon^1$  is actually a  $q$ -element vector  $\boldsymbol{\varepsilon}^1 = (\varepsilon_1, \dots, \varepsilon_q)^T$ .

1 | 9. (Currently amended) The computer program product-method of claim 7,  
2 | wherein if there exists no solution to the system of nonlinear equations, the  
3 | method further comprises determining that at least one of the following is true:

4 at least one of the set of measurements  $z_1, \dots, z_n$  is faulty;  
5 the observation model  $h(\mathbf{x} | c_i)$  is false;  
6 the error model  $\varepsilon^l(\mathbf{x}, c_i)$  is false; and  
7 the computational system used to compute interval bounds on elements of  
8  $\mathbf{x}$  is flawed.

1 | 10. (Currently amended) The computer program product-method of claim  
2 | 1, wherein solving the system of nonlinear equations involves:  
3 | linearizing the system of nonlinear equations to form a corresponding  
4 | system of linear equations; and  
5 | solving the system of linear equations.

1 | 11. (Currently amended) The computer program product-method of claim  
2 | 10, wherein solving the system of nonlinear equations involves using Gaussian  
3 | Elimination.

1 | 12. (Currently amended) A computer-readable storage medium storing  
2 | instructions that when executed by a computer cause the computer to perform a  
3 | method for computing interval parameter bounds from fallible measurements,  
4 | wherein the computer-readable storage medium includes magnetic storage  
5 | devices, optical storage devices, disk drives, magnetic tape, CDs (compact discs),  
6 | and DVDs (digital versatile discs or digital video discs), the method comprising:  
7 | receiving a set of measurements  $z_1, \dots, z_n$ , wherein an observation model  
8 | describes each  $z_i$  as a function of a  $p$ -element vector parameter  $\mathbf{x} = (x_1, \dots, x_p)$ ,  
9 | wherein receiving the set of measurements involves  
10 | receiving values for a set of conditions  $c_1, \dots, c_n$  under which the  
11 | corresponding observations  $z_i$  were made,

12                                wherein equations in the system of nonlinear equations  
13                                account for the conditions  $c_i$  and are of the form  $z_i - h(\mathbf{x} | c_i) = 0$   
14                                 $(i=1, \dots, n)$ , and  
15                                wherein each condition  $c_i$  is not known precisely but is  
16                                contained within an interval  $c_i^l$ ;  
17                                storing the set of measurements  $z_1, \dots, z_n$  in a memory in a computer  
18                                system;  
19                                forming a system of nonlinear equations  $z_i - h(\mathbf{x}) = 0$  ( $i=1, \dots, n$ ) based on  
20                                the observation model; and  
21                                solving the system of nonlinear equations to determine interval parameter  
22                                bounds on  $\mathbf{x}$ .

1                                13. (Original) The computer-readable storage medium of claim 12,  
2                                wherein the system of nonlinear equations is an “overdetermined system” in  
3                                which there are more equations than unknowns.

1                                14. (Original) The computer-readable storage medium of claim 12,  
2                                wherein each measurement  $z_i$  is actually a  $q$ -element vector of measurements  $\mathbf{z}_i =$   
3                                 $(z_{i1}, \dots, z_{iq})^T$ , and  $h$  is actually a  $q$ -element vector of functions  $\mathbf{h} = (h_1, \dots, h_q)^T$ .

1                                15 (Canceled).

1                                16. (Currently amended) The computer-readable storage medium of claim  
2                                12-claim 15, wherein each condition  $c_i$  is actually an  $r$ -element vector of  
3                                conditions  $\mathbf{c}_i = (c_{i1}, \dots, c_{ir})^T$ .

1                                17 (Canceled).

1 | 18. (Currently amended) The computer-readable storage medium of claim  
2 | 12-claim 15, wherein equations in the system of nonlinear equations are of the  
3 | form,  
4 |  $z_i - h(\mathbf{x} | c_i) + \varepsilon^l(\mathbf{x}, c_i) = 0$  ( $i=1, \dots, n$ ), which includes an error model  $\varepsilon^l(\mathbf{x}, c_i)$  that  
5 | provides interval bounds on measurement errors for  $z_i$ .

1 | 19. (Original) The computer-readable storage medium of claim 18,  
2 | wherein if  $z_i$  is actually a  $q$ -element vector of measurements  $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$ , then  
3 |  $\varepsilon^l$  is actually a  $q$ -element vector  $\varepsilon^l = (\varepsilon_1, \dots, \varepsilon_q)^T$ .

1 | 20. (Original) The computer-readable storage medium of claim 18,  
2 | wherein if there exists no solution to the system of nonlinear equations, the  
3 | method further comprises determining that at least one of the following is true:  
4 | at least one of the set of measurements  $z_1, \dots, z_n$  is faulty;  
5 | the observation model  $h(\mathbf{x} | c_i)$  is false;  
6 | the error model  $\varepsilon^l(\mathbf{x}, c_i)$  is false; and  
7 | the computational system used to compute interval bounds on elements of  
8 |  $\mathbf{x}$  is flawed.

1 | 21. (Original) The computer-readable storage medium of claim 12,  
2 | wherein solving the system of nonlinear equations involves:  
3 | linearizing the system of nonlinear equations to form a corresponding  
4 | system of linear equations; and  
5 | solving the system of linear equations.

1 | 22. (Original) The computer-readable storage medium of claim 21,  
2 | wherein solving the system of nonlinear equations involves using Gaussian  
3 | Elimination.

1           23. (Currently amended) An apparatus that computes interval parameter  
 2 bounds from fallible measurements, comprising:  
 3           a receiving mechanism configured to receive a set of measurements  
 4  $z_1, \dots, z_n$ , wherein an observation model describes each  $z_i$  as a function of a  
 5  $p$ -element vector parameter  $\mathbf{x} = (x_1, \dots, x_p)$ ,  
 6           wherein receiving the set of measurements involves  
 7           receiving values for a set of conditions  $c_1, \dots, c_n$  under which the  
 8           corresponding observations  $z_i$  were made,  
 9           wherein equations in the system of nonlinear equations  
 10           account for the conditions  $c_i$  and are of the form  $z_i - h(\mathbf{x} | c_i) = 0$   
 11            $(i=1, \dots, n)$ , and  
 12           wherein each condition  $c_i$  is not known precisely but is  
 13           contained within an interval  $c_i^l$ ;  
 14           a memory in a computer system for storing the set of measurements  
 15  $z_1, \dots, z_n$ ;  
 16           an equation forming mechanism configured to form a system of nonlinear  
 17 equations  $z_i - h(\mathbf{x}) = 0$  ( $i=1, \dots, n$ ) based on the observation model; and  
 18           a solver configured to solve the system of nonlinear equations to determine  
 19 interval parameter bounds on  $\mathbf{x}$ .

1           24. (Original) The apparatus of claim 23, wherein the system of nonlinear  
 2 equations is an “overdetermined system” in which there are more equations than  
 3 unknowns.

1           25. (Original) The apparatus of claim 23, wherein each measurement  $z_i$  is  
 2 actually a  $q$ -element vector of measurements  $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$ , and  $h$  is actually a  
 3  $q$ -element vector of functions  $\mathbf{h} = (h_1, \dots, h_q)^T$ .

1           26 (Canceled).

1           27. (Currently amended) The apparatus of claim 23 ~~claim 26~~, wherein each  
2   condition  $c_i$  is actually an  $r$ -element vector of conditions  $\mathbf{c}_i = (c_{i1}, \dots, c_{ir})^T$ .

1           28 (Canceled).

1           29. (Currently amended) The apparatus of claim 23 ~~claim 26~~, wherein  
2   equations in the system of nonlinear equations are of the form  $z_i - h(\mathbf{x} \mid c_i) + \varepsilon^l(\mathbf{x},$   
3    $c_i) = 0$  ( $i=1, \dots, n$ ), which includes an error model  $\varepsilon^l(\mathbf{x}, c_i)$  that provides interval  
4   bounds on measurement errors for  $z_i$ .

1           30. (Original) The apparatus of claim 29, wherein if  $z_i$  is actually a  $q$ -  
2   element vector of measurements  $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$ , then  $\varepsilon^l$  is actually a  $q$ -element  
3   vector  $\boldsymbol{\varepsilon}^l = (\varepsilon_1, \dots, \varepsilon_q)^T$ .

1           31. (Original) The apparatus of claim 29, wherein if there exists no  
2   solution to the system of nonlinear equations, the solver is configured to  
3   determine that at least one of the following is true:  
4           at least one of the set of measurements  $z_1, \dots, z_n$  is faulty;  
5           the observation model  $h(\mathbf{x} \mid c_i)$  is false;  
6           the error model  $\varepsilon^l(\mathbf{x}, c_i)$  is false; and  
7           the computational system used to compute interval bounds on elements of  
8    $\mathbf{x}$  is flawed.

1           32. (Original) The apparatus of claim 23, wherein the solver is configured  
2   to:

3 linearize the system of nonlinear equations to form a corresponding system  
4 of linear equations; and to  
5 solve the system of linear equations.

1 33. (Original) The apparatus of claim 32, wherein the solver is configured  
2 to solve the system of nonlinear equations using Gaussian Elimination.